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# Engineering in a Forestry Environment

U.S. Department of Agriculture  
Forest Service



Program Aid 1311  
October 1982





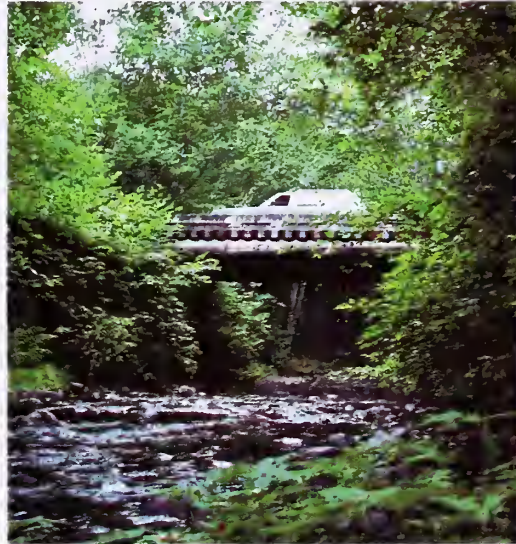
## *Engineering in a Forestry Environment*

Engineers are needed in many different places by many different outfits. Becoming an engineer is not easy, and those who make it are in demand. Each job offer made to an engineer has the same purpose: to fill a position with an appropriate skill.

The income offered is one thing, but it does not stand alone. Engineering is a profession in which there is a range of salaries, generally based on qualifications and experience. There is competition for engineering skills and the pay for them must be adequate. The initial salary offered, however, is only a beginning. Of equal importance is whether additions to that income are scheduled or subject to negotiation step by step.

There are satisfactions other than income to be weighed in any job offer. *Applying your skills broadly in a variety of projects is both stimulating and professionally rewarding.* The working conditions and the places you will be

required to live are considerations. Whether you will be working with other professionals—engineers and nonengineers—may influence your decision. The job security, career opportunity, individual development, and potential for professional growth should be measured. Personal satisfaction from the product of your efforts



can be the most important of all: Will you be proud of what you have accomplished at the completion of each project? That is the keynote of our engineering in a forestry environment.



## The Forest Service

A forest is a natural resource which, under proper management, is renewable; for trees are a crop to be tended, harvested, and replanted. Within the forests are other natural resources: wildlife, air and water, soil, visual beauty, and grazing land for domestic herds.

The forest areas offer recreation to our people: campsites and picnic areas, water sports and boating, hiking and skiing.

Beneath the forests are minerals: sources of national wealth and usefulness.

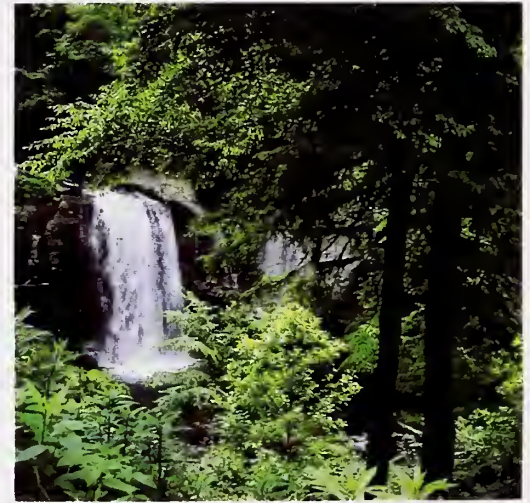
Responsibility for managing the forests that belong to the people of our Nation—the National Forests—is assigned to the Forest Service, part of the U.S. Department of Agriculture.

There are over 150 National Forests managed by the Forest Service: almost 200 million acres of forests, lakes, mountains, and grassland, in all but a few of the 50 States. There are over

600 Forest Ranger Districts and over 800 youth camps and projects; there are *experimental laboratories*, *research projects*, and *equipment development centers*. Throughout this vast area—equal to a tenth of the continental United States—are thousands of structures and their support facilities, hundreds of thousands of miles of roads



and trails, all planned, designed, and constructed by the Forest Service. These are maintained and rehabilitated as needed for continuing usefulness. Hundreds of new structures and thousands of miles of roads and trails must be added to this system each year. It's a big job and a constant one. It's our job: Forest Service Engineering.







## *Forest Service Engineering*

The Forest Service needs and maintains one of the biggest single engineering outfits in the world: about 1,500 engineers—mostly civil, but including mechanical and electrical engineers—and some 3,000 engineering aides and technicians.

Our main engineering job is roads. Ours is the largest network of roads in the world under a single management: over 300,000 miles of roads, ranging from paved highways to low-use roads in every type of terrain. We are internationally recognized as foremost experts in the design, construction, and maintenance of low-volume roads. In addition to roads, we have about 100,000 miles of trails to maintain. Our backlog for the planning, design, and construction of new roads and trails is never ending, and we must program the maintenance of each new mile.

Our job—planning, design, construction, operation, maintenance—extends into all phases of engineering en-

countered in urban areas, but most of it must be accomplished in a forestry environment that is remote from supply sources and under unique conditions of terrain and climate. Our work encompasses all Forest Service facilities—buildings, from small structures made of local materials to major modern offices or laboratories, including electrical, plumbing, heating, ventilating, and cooling systems; solid waste disposal systems serving large areas, and water and wastewater treatment systems for developed sites within the National Forests; water impoundments, cable systems for ski lifts and logging, boat docks and launching



ramps, camping and picnicking areas, heliports and landing strips, footbridges on hiking trails, and bridges on low-use roads, logging roads, hard-surface roads, and multilane highways, as well as communication networks. In addition, we do research on forest products and their uses, we develop specialized mechanical equipment and vehicles, and we operate and maintain one of the largest fleets of vehicles and equipment in the U.S. Government.

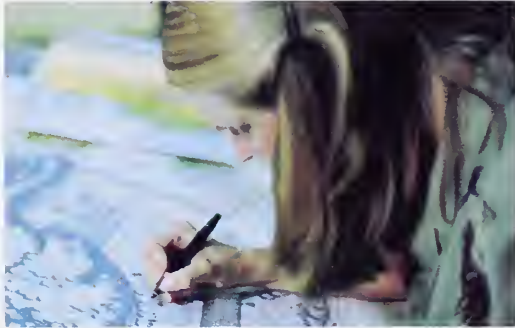


That's engineering in a forestry environment: challenging, varied, stimulating, important, and satisfying. Ours is engineering in its fullest sense, significantly different from any other kind of engineering, because nothing we do is engineering alone. Our job is to support the management of almost 200 million acres of public land. This means retaining the natural beauty of that land; serving the recrea-





tional needs of our people; preserving the wildlife; and protecting the watersheds, soil, and streams, as part of each project. It means working in concert with others in everything we do: with geologists, soil scientists, foresters, wildlife and recreation specialists, or landscape architects. We are professionals working with other professionals in an interdisciplinary team effort on each project. The resulting reward for those efforts is engineering in harmony with the land, for the good of the Nation and its people.



Land management includes multiple uses of our resources, their protection and conservation, and control over them to ensure that they are committed to the most common good.

As engineers, we offer our special skills for cadastral and topographic surveys, feasibility studies, benefit/cost analyses, photogram-



metry, transportation systems, and buildings and other structures, with alternatives to meet general or special requirements. The result, again, is a reward: engineering accomplished for the most effective overall use of the resources on and beneath our public land.

That is what we do in Forest Service Engineering. Where we do it—in the forestry environment—is important, too.





## *The Forestry Environment*

Working within the U.S. Government is much the same as working within any large organization. There is a top echelon. With us, that is the U.S. Department of Agriculture.

The Forest Service is headed by the Chief of the Forest Service, who is assisted by a staff in what we call our Washington Office. The functions of the Forest Service are carried out through five Deputy Chiefs for:

- Administration
- Programs and Legislation
- Research
- State and Private Forestry
- The National Forest System

Engineers serve primarily in the National Forest System. Also, they are individually assigned, as their skills are needed, to other "Deputy Areas"; for example, to Forest and Range Experiment Stations in Research or to field offices in State and Private Forestry.



The National Forest System is divided into nine Regions. Each Region contains a number of National Forests and is directed by a Regional Forester.

The National Forests are headed by Forest Supervisors, some of whom have more than one Forest under their control. Most of our engineers work at the National Forest level. A Forest is usually divided into Districts, each headed by a District Ranger. This is



the line of orders, instructions, and directives in the National Forest System: from the Chief of the Forest Service to Regional Foresters, Forest Supervisors, and District Rangers. Each level of authority includes a staff to assist the officer in charge. Engineers serve in a staff capacity at the Washington Office level and at the Regional and Forest levels.

The senior engineer in each Region is designated as the Regional Director of Engineering. The senior engineer at the Forest level is the Forest Engineer. The other engineers at these levels



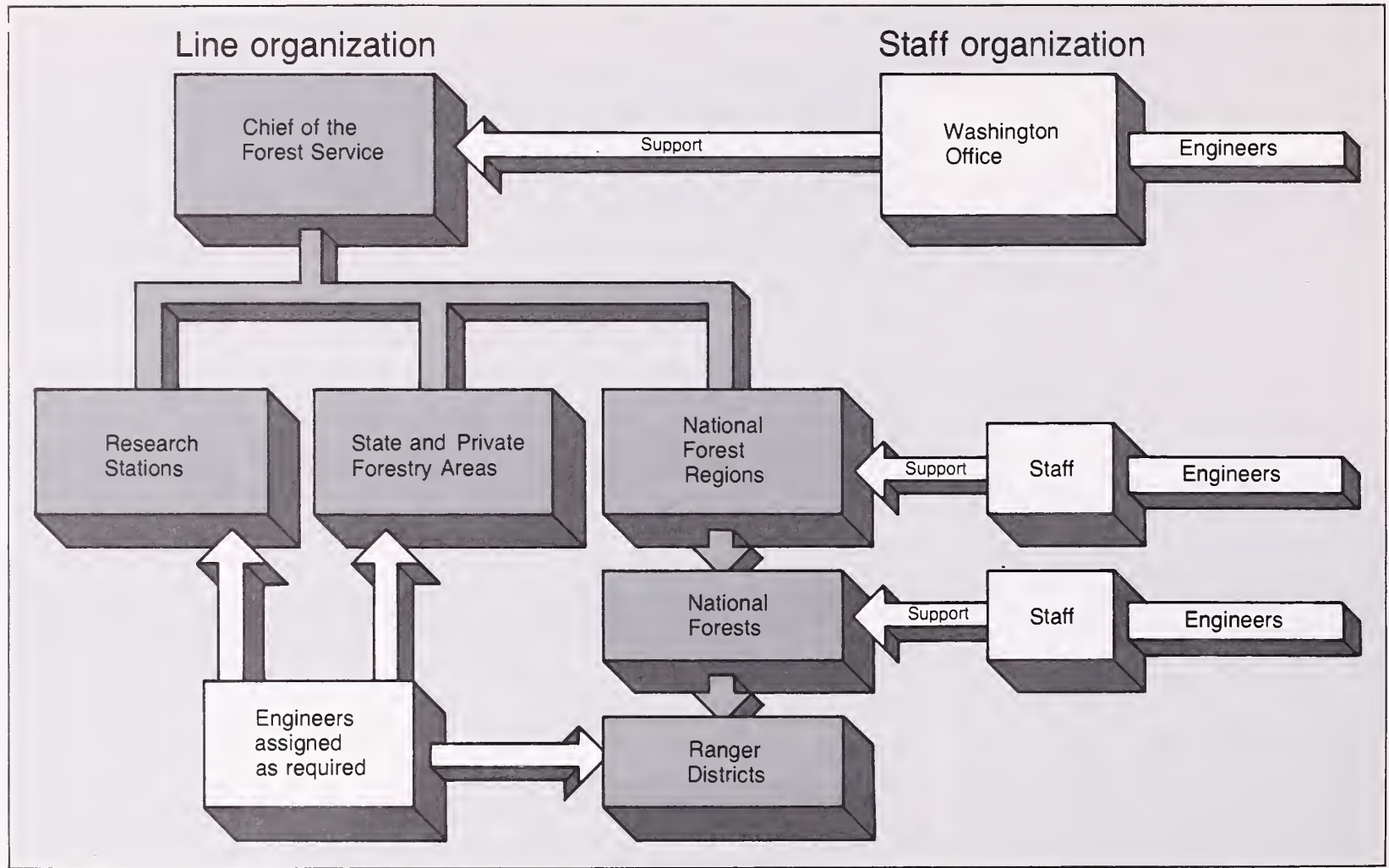
receive instructions, assignments, and guidance from the senior engineer.

Engineers may also be assigned to assist Forest and Range Experiment Stations, the Forest Products Laboratory, or Equipment Development Centers.

Where you work, therefore, will be varied and interesting. As a Forest Service Engineer, you will be part of a







group of professionals working toward a common goal: protection, development, and enhancement of the Nation's natural resources. Your early assignments will most likely be at the National Forest level, working for the Forest Engineer out of the Forest Supervisor's office. Most of these offices are located in towns or small cities, although a number of them are in places such as San Diego, Portland,



Seattle, and Salt Lake City. Your work will be divided between your office and field sites. You will live in a community convenient to these sites and, as a Forest Service officer, will find yourself welcomed into its civic and social activities. There are Forest Service Engineers in each Region and every National Forest. The list on pages 14 and 15 shows that our workshop is the entire Nation.

Under the guidance of the Forest Engineer, you will work with other engineers and professionals, engineering aides and technicians, and skilled support personnel.

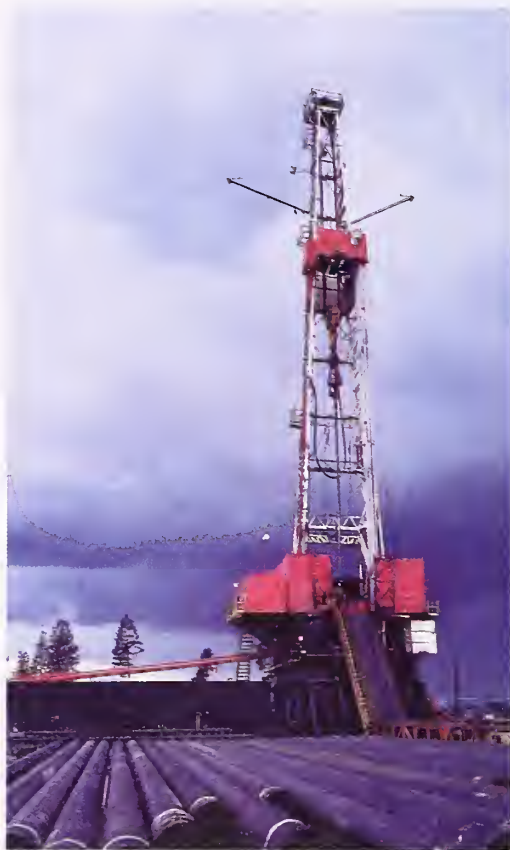
The Forest Engineer has the responsibility of applying your skills and expanding your experience for growth in your profession. For these purposes, transfers to different locations and different types of engineering tasks are common in the first years of service.

As your knowledge and experience increase, higher positions of greater

responsibility will be opened to you, including those at the Regional Offices in such cities as San Francisco, Denver, Atlanta, and Milwaukee.

You will work with the most modern equipment and techniques: satellite surveillance systems; computer storage and retrieval of data, with





automated design analysis programs; and precision scientific equipment for research.

You will also work in the most scenic places of the Nation: places set aside and protected not only for their natural resources but also for their natural beauty. The mountains of New England; the Blue Ridge and Great Smokies of the South; the shores of Lake Superior; the Rockies and the Cascades; and Alaska. It is in such places that we do our engineering in a forestry environment. There are so many such places and so much to do in them that our work is measured in generations. It began in 1905, and it will continue.

## National Forest System





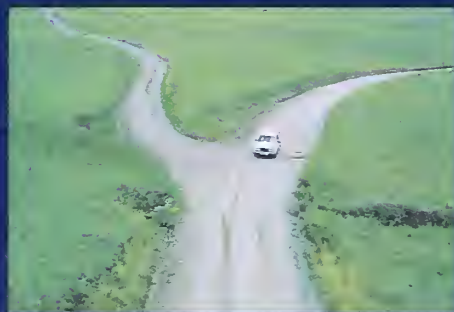


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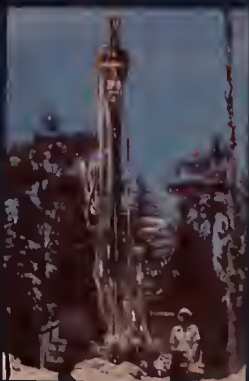
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National Forest System











## The National Forest System

In this list the Regions, States, and names of National Forests are shown in left-hand columns. The right-hand columns list the locations of Forest Supervisors' offices, from which our Engineers operate.

### NORTHERN REGION (Region 1)

#### Idaho

<i>Clearwater</i>	Orofino
<i>Coeur d'Alene</i>	Coeur d'Alene
<i>Kaniksu</i>	Coeur d'Alene
<i>St. Joe</i>	Coeur d'Alene
<i>Nezperce</i>	Grangeville

#### Montana

<i>Beaverhead</i>	Dillon
<i>Bitterroot</i>	Hamilton
<i>Custer</i>	Billings
<i>Deerlodge</i>	Butte
<i>Flathead</i>	Kalispell
<i>Gallatin</i>	Bozeman
<i>Helena</i>	Helena
<i>Kootenai</i>	Libby
<i>Lewis and Clark</i>	Great Falls
<i>Lolo</i>	Missoula

### ROCKY MOUNTAIN REGION (Region 2)

#### Colorado

<i>Arapaho</i>	Ft. Collins
<i>Roosevelt</i>	Ft. Collins
<i>Grand Mesa</i>	Delta
<i>Uncompahgre</i>	Delta
<i>Gunnison</i>	Delta
<i>Pike</i>	Pueblo
<i>San Isabel</i>	Pueblo
<i>Rio Grande</i>	Monte Vista
<i>Routt</i>	Steamboat Springs

<i>San Juan</i>	Durango
<i>White River</i>	Glenwood Springs

#### Nebraska

<i>Nebraska</i>	Chadron
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#### Samuel R.

<i>McKelvie</i>	Chadron
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#### South Dakota

<i>Black Hills</i>	Custer
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#### Wyoming

<i>Bighorn</i>	Sheridan
<i>Medicine</i>	
<i>Bow</i>	Laramie
<i>Shoshone</i>	Cody

### SOUTHWESTERN REGION (Region 3)

#### Arizona

<i>Apache</i>	Springerville
<i>Sitgreaves</i>	Springerville
<i>Coconino</i>	Flagstaff
<i>Coronado</i>	Tucson
<i>Kaibab</i>	Williams
<i>Prescott</i>	Prescott
<i>Tonto</i>	Phoenix

#### New Mexico

<i>Carson</i>	Taos
<i>Cibola</i>	Albuquerque
<i>Gila</i>	Silver City
<i>Lincoln</i>	Alamogordo
<i>Santa Fe</i>	Santa Fe

### INTERMOUNTAIN REGION (Region 4)

#### Idaho

<i>Boise</i>	Boise
<i>Caribou</i>	Pocatello
<i>Challis</i>	Challis
<i>Payette</i>	McCall
<i>Salmon</i>	Salmon
<i>Sawtooth</i>	Twin Falls
<i>Targhee</i>	St. Anthony

#### Nevada

<i>Humboldt</i>	Elko
<i>Toiyabe</i>	Reno

#### Utah

<i>Ashley</i>	Vernal
<i>Dixie</i>	Cedar City

#### Fishlake Manti-LaSal

<i>Uinta</i>	Price
<i>Wasatch</i>	Provo
<i>Cache</i>	Salt Lake City
	Salt Lake City

#### Wyoming

<i>Bridger</i>	Jackson
<i>Teton</i>	Jackson

### PACIFIC SOUTHWEST REGION (Region 5)

#### California

<i>Angeles</i>	Pasadena
<i>Cleveland</i>	San Diego
<i>Eldorado</i>	Placerville
<i>Inyo</i>	Bishop
<i>Klamath</i>	Yreka
<i>Lassen</i>	Susanville
<i>Los Padres</i>	Goleta
<i>Mendocino</i>	Willows
<i>Modoc</i>	Alturas
<i>Plumas</i>	Quincy
<i>San Bernardino</i>	San Bernardino
<i>Sequoia</i>	Porterville
<i>Shasta</i>	Redding
<i>Trinity</i>	Redding
<i>Sierra</i>	Fresno
<i>Six Rivers</i>	Eureka
<i>Stanislaus</i>	Sonora
<i>Calaveras</i>	Sonora
<i>Big Tree</i>	
<i>Tahoe</i>	Nevada City

## PACIFIC NORTHWEST REGION (Region 6)

### Oregon

<i>Deschutes</i>	Bend
<i>Fremont</i>	Lakeview
<i>Malheur</i>	John Day
<i>Mt. Hood</i>	Portland
<i>Ochoco</i>	Prineville
<i>Rogue River</i>	Medford
<i>Siskiyou</i>	Grants Pass
<i>Suislaw</i>	Corvallis
<i>Umatilla</i>	Pendleton
<i>Umpqua</i>	Roseburg
<i>Wallowa</i>	Baker
<i>Whitman</i>	Baker
<i>Willamette</i>	Eugene
<i>Winema</i>	Klamath Falls

### Washington

<i>Colville</i>	Colville
<i>Gifford</i>	
<i>Pinchot</i>	Vancouver
<i>Mt. Baker</i>	Seattle
<i>Snoqualmie</i>	Seattle
<i>Okanogan</i>	Okanogan
<i>Olympic</i>	Olympia
<i>Wenatchee</i>	Wenatchee

## SOUTHERN REGION (Region 8)

### Alabama

<i>William B.</i>	
<i>Bankhead</i>	Montgomery
<i>Concuah</i>	Montgomery
<i>Talladega</i>	Montgomery
<i>Tuskegee</i>	Montgomery

### Arkansas

<i>Ouachita</i>	Hot Springs
	National Park
<i>Ozark</i>	Russellville
<i>St. Francis</i>	Russellville

### Florida

<i>Apalachicola</i>	Tallahassee
<i>Ocala</i>	Tallahassee
<i>Osceola</i>	Tallahassee

### Georgia

<i>Chatahoochee</i>	Gainesville
<i>Oconee</i>	Gainesville
<i>Daniel Boone</i>	Winchester

### Louisiana

<i>Kisatchie</i>	Pineville
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### Mississippi

<i>Bienville</i>	Jackson
<i>Delta</i>	Jackson
<i>DeSota</i>	Jackson
<i>Holly Springs</i>	Jackson
<i>Homochitto</i>	Jackson
<i>Tombigbee</i>	Jackson

### North Carolina

<i>Croatan</i>	Asheville
<i>Nantahala</i>	Asheville
<i>Pisgah</i>	Asheville
<i>Uwharrie</i>	Asheville

### Puerto Rico

<i>Caribbean</i>	Rio Piedras
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### South Carolina

<i>Francis</i>	
<i>Marion</i>	Columbia
<i>Sumter</i>	Columbia
<i>Tennessee</i>	Cleveland

### Texas

<i>Angelina</i>	Lufkin
<i>Davy</i>	
<i>Crockett</i>	Lufkin
<i>Sabine</i>	Lufkin
<i>Sam Houston</i>	Lufkin

### Virginia

<i>George</i>	
<i>Washington</i>	Harrisonburg
<i>Jefferson</i>	Roanoke

## EASTERN REGION

### (Region 9)

### Illinois

<i>Shawnee</i>	Harrisburg
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### Indiana-Ohio

<i>Wayne</i>	Bedford
<i>Hoosier</i>	Bedford

### Michigan

<i>Hiawatha</i>	Escanaba
<i>Huron</i>	Cadillac
<i>Manistee</i>	Cadillac
<i>Ottawa</i>	Ironwood

### Minnesota

<i>Chippewa</i>	Cass Lake
<i>Superior</i>	Duluth

### Missouri

<i>Mark Twain</i>	Rolla
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### New Hampshire-Maine

<i>White</i>	
<i>Mountain</i>	Laconia

### Pennsylvania

<i>Allegheny</i>	Warren
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### Vermont

<i>Green</i>	
<i>Mountain</i>	Rutland

### West Virginia

<i>Monongahela</i>	Elkins
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### Wisconsin

<i>Chequamegon</i>	Park Falls
<i>Nicolet</i>	Rhineland

## ALASKA REGION

### (Region 10)

### Alaska

<i>Chugach</i>	Anchorage
<i>Tongass-</i>	
<i>Chatham</i>	Sitka
<i>Tongass-</i>	
<i>Ketchikan</i>	Ketchikan
<i>Tongass-</i>	
<i>Stikine</i>	Petersburg



## *A Career in the Forest Service*

Because it's big and busy, because its responsibilities are established by public law, and because the huge land area under its management has been set aside by the people as their own, the Forest Service can confidently offer careers instead of jobs. There is more than job security in our Service: there is career opportunity.

Forest Service salaries are generally comparable with similar non-Government positions. Engineers are in a shortage category and are offered higher beginning salaries than those in most other categories in the same entry level. The starting salary is flexible, based on the education, special skill, and experience of the individual. Pay increases are scheduled for each grade level.

Promotions from the initial position are made on merit, although engineers hired at the entry levels (normally GS-5 to GS-7) may be promoted to the GS-9 level without competition. Vacancies



at midgrade or higher levels (GS-11 and above) are announced, with eligibility requirements stated. All those eligible may apply for the higher position, and all applicants are considered. The best qualified applicant is accepted for promotion, regardless of seniority. It is our policy that both initial appointments in the Forest Service and all subsequent promotions be based on qualifications, with equal opportunity for all. There is a vigorous

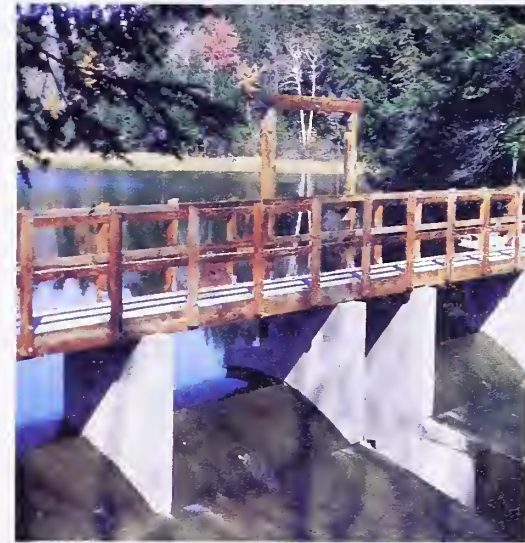


and sustained affirmative action program to carry out this policy.

The career development of each individual is planned. From your first assignment in Forest Service Engineering, you will be guided and counseled on personal and professional development by senior engineers. With their assistance, and the benefit of their experience, you will be able to define your own career development



plan: first in broad terms, then increasingly refined as your experience within the Forest Service expands and your special interests become more distinct. Career development is an ongoing process in which your supervisors advise, you make the decisions, and the Forest Service commits its resources to help you attain your goals.



During the first few years of your service, your assignments will be pointed toward applying your professional knowledge in a variety of conditions and activities. You will work on projects that not only meet our needs but also add to your skills. This will be a time in which both you and those who direct your efforts can together assess your strong points and what you may require to further develop your abilities. You and your



supervising engineer will periodically consider your work experience, your goals, your needs, and how the Forest Service can contribute to them. From this, your individual career development plan will take form and the supporting actions of the Forest Service can be effected.

The pattern of growth and advancement of our engineers falls into three general and related career futures:

- Continuation as a generalist in your chosen profession.



- Specialization in some aspect of your profession.
- Concentration on the management aspects of your profession.

Each of these offers advantages which must be weighed against the advantages offered by the others. The decision will be yours. It need not and should not be made hastily.

Our career development system begins at the entrance level and continues into the selected career path. We can assist you in several ways. They include:

- Guided self-study, based on your needs and goals.





- Task assignments, to expand your practical experience.
- Relocation to areas where different tasks and conditions add to your professional versatility.
- Special assignment to unique tasks or conditions.
- Formal training through Government courses or classes on subjects appropriate to your career needs.



- Encouragement for continuing non-Government education. This may be in technical engineering subjects, in supervision and management, or toward advanced degrees. Tuition assistance may be provided if such courses are related to your Forest Service assignment.
- Temporary detailing to higher positions, where you can test yourself in greater responsibility without detriment to your existing assignment.



As a career asset, we encourage professional registration or licensing of our engineers and membership in professional organizations, subscriptions and contributions of articles to their journals, and attendance at their meetings.







## *Benefits*

Career planning, equal opportunity, merit advancements, and periodic pay increases are supported by other benefits offered you as an employee of the U.S. Government.

- Nine paid Federal holidays each year.
- Generous annual leave, with 13 workdays of annual leave with pay for your first year of service.
- Sick leave with pay, for illness or injury, built up as you work at the rate of 1 day for each 4 weeks on the job, with no limit on the amount of sick leave you can earn.
- Leave without pay, if you need it.
- Leave with pay, separate from annual leave, for such things as jury or other court duty.
- Military leave with pay, separate from annual leave for members of the Armed Forces Reserve and National Guard.
- Low-cost group life insurance.

- Group health benefits, both family and individual.
- Compensation for injuries received on-the-job.



- Survivor benefits after 18 months of service, and eligibility for disability retirement after 5 years of service.
- Incentive awards, including cash awards, for special acts or services, sustained superior service and suggestions resulting in more economical or efficient operations.
- Travel expenses to your first duty station and for subsequent transfers.
- A full retirement system, with the U.S. Government paying a substantial share of the cost.



- Job security: On completion of your third full year in the Forest Service, you will be in career status in the Government civil service system, one of the most stable forms of employment in the Nation.







## *Engineering With a Plus*

There is something to add to all that has been said: the satisfaction we get from our work. You will encounter it upon entering and wherever you go in the Forest Service. You will discover it in yourself.

There is satisfaction in working with and for engineers who enjoy what they are doing and enjoy where they are doing it. And, there is satisfaction in working with other interesting, skilled, dedicated people who are accustomed to team efforts and common goals.

There is satisfaction in being part of an organization recognized and respected for its professionalism by the scientific community, the military, industry, conservation groups, the Congress, and foreign nations.

And there is satisfaction in knowing that every project you complete is useful, productive, and of service to the Nation. It all adds up to something more than engineering.



## The Final Word

The final word is *challenge*.

Forest Service Engineering is not easy. It involves some of the most difficult engineering in the world, done in the most rugged areas of our Nation. The knowledge you have acquired in becoming an engineer is applied in a unique way in the Forest Service. Much of what you have learned is based on experience in urban areas. The raw country in which we do most



of our engineering stands apart from the guidelines of books and classrooms. There are no readily available solutions out there: Our engineers must create them through their own ingenuity and resourcefulness, imagination and independent decision, as well as their professional skill. These are the engineers we seek.

Getting into Forest Service Engineering is not easy. Our kind of work calls for the best. We select, not just hire. Our standards are high because the demands on us are great.



If you believe that your qualifications will meet those standards, and that your potential will match those demands, find out more about us. Any of the offices on the following list will provide you with additional information and instructions on how to apply for a position in Forest Service Engineering.



USDA Forest Service  
P.O. Box 2417  
Washington, D.C. 20013

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Regional Forester  
USDA Forest  
Service

Alaska Region:  
Federal Office Building  
P.O. Box 1628  
Juneau, AK 99802

Southwestern  
Region:  
517 Gold Avenue, SW  
Albuquerque, NM 87102

Pacific Southwest  
Region:  
630 Sansome Street  
San Francisco, CA 94111

Rocky Mountain  
Region:  
11177 West 8th Avenue  
P.O. Box 25127  
Denver, CO 80225

Intermountain  
Region:  
324 25th Street  
Ogden, UT 84401

Northern Region:  
Federal Building  
Missoula, MT 59807

Pacific Northwest  
Region:  
319 SW Pine Street  
P.O. Box 3623  
Portland, OR 97208

Eastern Region:  
633 W. Wisconsin Avenue  
Milwaukee, WI 53203

Southern Region:  
1720 Peachtree Road, NW  
Atlanta, GA 30367

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### Equal Opportunity

All Forest Service employment is based on qualifications without regard to race, color, creed, religion, handicaps, sex, national origin, politics, marital status, age, membership in an employee organization, or any other nonmerit factor.



